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CLAIMS

1. A data transmission method in a telecommunication system, which method comprises a step of

transmitting data in frames of a link protocol provided with a retransmission mechanism from a transmitting end to a receiving end,

**characterized by**

transmitting data in information fields of the protocol frames in fixed-length data blocks which have been numbered,

using said data block numbering in said retransmission mechanism, changing the length of the protocol frame during the connection,

inserting the payload units to be retransmitted, which were transmitted for the first time before the frame length was changed, into one or several protocol frames with a new frame length.

2. A method according to claim 1, **characterized** in that the method comprises steps of

splitting the data to be transmitted into fixed-length payload units provided with payload numbers in order to distinguish the units from one another,

inserting one or more payload units into the information field of each protocol frame,

providing a header field of a protocol frame with payload numbering, which indicates the payload units contained in the information field of the protocol frame,

transmitting the frames from the transmitting end to the receiving end,

acknowledging payload units which have been received appropriately, requesting for transmission of new payload units or requesting for retransmission of payload units which have not been received appropriately by means of said payload numbers.

3. A method according to claim 1 ~~or 2~~, **characterized** in that the method comprises steps of

unpacking the payload units from the protocol frames with the old frame length contained in a retransmission buffer at the transmitting end after the frame length has been changed.

4. A method according to <sup>claim 1</sup> ~~any one of the preceding claims~~, **characterized** in that said link protocol provided with a retransmission

mechanism is a layer 2 link protocol, such as a radio link protocol (RLP), a link access control (LAC) protocol or a radio link control protocol (RLCP), or a protocol situated below them, such as medium access control (MAC).

a 5. A method according to <sup>claim 1</sup> ~~any one of the preceding claims~~, **characterized by**

indicating in the header of the protocol frame in a normal situation the number of only one payload unit contained in the information field,

indicating in the header of the protocol frame the number of every payload unit in the information field individually, when payload units with  
10 unsuccessive numbers are retransmitted in the protocol frame in a special situation.

6. A method according to claim <sup>5</sup> ~~8~~, **characterized by**  
indicating said individual payload numbers in a frame header extension at the beginning of said information field.

15 7. A method according to claim 5 ~~or 6~~, **characterized** in that said special situation is a change in the data rate.

8. A data transmission method in a mobile communication system comprising a mobile services switching centre with a first link protocol having a fixed frame length, provided with a retransmission mechanism for non-transparent data transmission; a radio access network with a second link protocol provided with a retransmission mechanism for non-transparent data transmission, the frame length of the second protocol being variable or the frame being longer than the frame of the first protocol; and an interworking unit via which the radio access network is connected to the mobile services  
20 switching centre, the method comprising steps of

transmitting data in frames of the first link protocol between the interworking unit and the mobile services switching centre,

using frame numbering in said retransmission mechanism between the interworking unit and the mobile services switching centre,

30 transmitting data in frames of the second link protocol between the mobile station and the interworking unit,

**characterized by**

transmitting data in the information fields of the second link protocol frames in the form of data blocks which are numbered, the length of said data  
35 block being equal to the length of the information field of the first link protocol frame,

using said data block numbering in said retransmission mechanism between the interworking unit and the mobile station, said data block numbering being directly compatible with the frame numbering used between the interworking unit and the mobile services switching centre.

5 9. A data transmission method in a mobile communication system comprising a mobile services switching centre with a first link protocol having a fixed frame length, provided with a retransmission mechanism for non-transparent data transmission; a radio access network with a second link  
10 transmission, the frame length of the second protocol being variable; and an interworking unit via which the radio access network is connected to the mobile services switching centre, the method comprising steps of

transmitting data in frames of the first link protocol between the interworking unit and the mobile services switching centre,

15 transmitting data in frames of the second link protocol between the mobile station and the interworking unit,

**characterized by**

transmitting data in the information fields of the second link protocol frames in the form of data blocks which are numbered,

20 selecting the length of the data block such that the frame length of the second link protocol is equal to or smaller than the length of the first link protocol frame or information field,

transmitting the frames of the second link protocol in place of the frames of the first link protocol or in the information fields thereof between the  
25 interworking unit and the mobile services switching centre,

using said data block numbering in the retransmission mechanism according to the second link protocol over the entire connection between the mobile station and the mobile services switching centre.

30 10. A telecommunication system comprising a transmitter (Tx) and a receiver (Rx) and a link protocol provided with a retransmission mechanism, the transmitter and the receiver being arranged to transmit data in the frames of the link protocol from the transmitting end to the receiving end, **characterized** in that the data is placed in the information fields of the protocol frames (62, 71, 73, 75) in fixed-length data blocks (62) which are numbered,  
35 and that said retransmission mechanism is arranged to utilize said data block numbering, and that the length of the protocol frame (62, 71, 73, 75) can be

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changed during the connection, and that the transmitter (Tx) is arranged to insert the payload units to be retransmitted, which were transmitted for the first time before the frame length was changed, into one or several protocol frames with a new frame length in response to the changing of the frame length.

5 11. A system according to claim 10, **characterized** in that the information field of each protocol frame comprises one or more data blocks (62) and that a header field (H) of a protocol frame is provided with payload numbering indicating the payload units in the information field of the protocol frame.

10 12. A system according to claim 10 ~~or 11~~, **characterized** in that the receiver (Rx) is arranged to acknowledge appropriately received payload units (62), to request for transmission of new payload units or to request for retransmission of inappropriately received payload units by means of said payload numbers.

15 13. A system according to claim 10, ~~11 or 12~~, **characterized** in that the transmitter (Tx) is arranged to unpack the payload units from the protocol frames with the old frame length in the retransmission buffer in response to the changing of the frame length.

20 14. A system according to <sup>claim 10</sup> ~~any one of claims 10 to 13~~, **characterized** in that said link protocol provided with a retransmission mechanism is a layer 2 link protocol, such as a radio link protocol (RLP); a link access control (LAC) protocol or a radio link control protocol (RLCP), or a protocol situated below them, such as medium access control (MAC).

25 15. A system according to <sup>claim 10</sup> ~~any one of claims 10 to 14~~, **characterized** in that the length of the payload unit (62) can be obtained either directly or indirectly from inband or outband signalling.

30 16. A system according to <sup>claim 10</sup> ~~any one of claims 10 to 15~~, **characterized** in that the length of the payload unit (62) can be negotiated at the beginning of the connection and/or during the connection.

35 17. A system according to <sup>claim 10</sup> ~~any one of claims 10 to 16~~, **characterized** in that

the header of the protocol frame normally contains the number of one payload unit in the information field,

the header of the protocol frame contains the individual number of each payload unit in the information field when payload units with

unsuccessive numbers are retransmitted in the protocol frame in a special situation, which is, for example, a change in the data rate.

180. A system according to claim 17, **characterized** in that the header of the protocol frame can be extended to the beginning of the information field in order to indicate said individual payload numbers.

19. A mobile communication system comprising a mobile services switching centre (MSC) with a first link protocol (RLP) provided with a fixed frame length and a retransmission mechanism utilizing frame numbering for non-transparent data transmission; a radio access network (RAN) with a second link protocol (LAC) provided with a retransmission mechanism for non-transparent data transmission, the frame length of the second protocol being variable or the frame being longer than the frame of the first protocol; and an interworking unit (IWU) via which the radio access network (RAN) is connected to the mobile services switching centre (MSC) such that a transmission link is provided between a mobile station (MS) and the mobile services switching centre (MSC) via the radio access network (RAN), the transmission link comprising a first leg between the interworking unit (IWU) and the mobile services switching centre (MSC) and a second leg between the mobile station (MS) and the interworking unit (IWU), **characterized** in that the data is situated in the information fields of the second link protocol (LAC) frames in the form of data blocks (62) which are numbered, the length of said data block (62) equalling the length of the information field of the first link protocol (RLP) frame, and that the retransmission mechanism of the second link protocol (LAC) is arranged to use said data block numbering between the interworking unit (IWU) and the mobile station (MS), said data block numbering being directly compatible with the frame numbering used between the interworking unit (IWU) and the mobile services switching centre (MSC).

20. A mobile communication system comprising a mobile services switching centre (MSC) with a first link protocol (RLP) having a fixed frame length, provided with a retransmission mechanism for non-transparent data transmission; a radio access network (RAN) with a second link protocol (LAC) provided with a retransmission mechanism for non-transparent data transmission, the frame length of the second protocol being variable; and an interworking unit (IWU) via which the radio access network (RAN) is connected to the mobile services switching centre (MSC) such that a transmission link is provided between a mobile station (MS) and the mobile services switching

centre (MSC) via the radio access network (RAN), the transmission link comprising a first leg between the interworking unit (IWU) and the mobile services switching centre (MSC) and a second leg between the mobile station (MS) and the interworking unit (IWU), **characterized** in that the mobile station (MS) and the interworking unit (IWU) are arranged to transmit data in the information fields of the second link protocol (LAC) frames in the form of data blocks (62) which are numbered, and that the length of the data block (62) is such that the frame length of the second link protocol (LAC) is equal to or smaller than the length of the first link protocol (RLP) frame or information field, and that the interworking unit (IWU) and the mobile services switching centre (MSC) are arranged to transmit the frames of the second link protocol (LAC) in place of the frames of the first link protocol (RLP) or in the information fields thereof between the interworking unit (IWU) and the mobile services switching centre (MSC), and that the mobile station (MS) and the mobile services switching centre (MSC) are arranged to use said data block numbering in the retransmission mechanism according to the second link protocol (LAC) over the entire connection between the mobile station and the mobile services switching centre.

21. A mobile station (MS) which is arranged to transmit and receive data in frames of a link protocol (LAC) provided with a retransmission mechanism, **characterized** in that the data is placed in information fields of the protocol frames in the form of fixed-length data blocks (62) which are numbered, and that said retransmission mechanism is arranged to utilize said data block numbering, and that the length of the protocol frame can be changed during the connection, and that the mobile station (MS) is arranged to insert the data blocks to be retransmitted, which were transmitted for the first time before the frame length was changed, into one or several protocol frames with a new frame length in response to the changing of the frame length.

22. A mobile station according to claim 21, **characterized** in that the information field of each protocol frame comprises one or more data blocks (62), and that a header field (H) of a protocol frame is provided with payload numbering indicating the data blocks (62) contained in the information field of the protocol frame.

23. A mobile station according to claim 21 ~~or 22~~, **characterized** in that the mobile station (Rx) is arranged to acknowledge appropriately

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received data blocks, to request for transmission of new data blocks or to request for retransmission of inappropriately received data blocks.

a 24. A mobile station according to <sup>claim 21</sup> ~~any one of claims 21 to 23~~,  
characterized in that said link protocol provided with a retransmission  
5 mechanism is a layer 2 link protocol, such as a radio link protocol (RLP), a link  
access control (LAC) protocol or a radio link control protocol (RLCP), or a  
protocol situated below them, such as medium access control (MAC).

a 25. A mobile station according to <sup>claim 21</sup> ~~any one of claims 21 to 24~~,  
characterized in that it is a dual-mode mobile station with ability to  
10 operate in two radio systems with different radio interfaces.

a 26. A mobile station according to <sup>claim 21</sup> ~~any one of claims 21 to 25~~,  
characterized in that

the header of the protocol frame normally contains the number of  
one payload unit situated in the information field,

15 the header of the protocol frame contains the individual number of  
each payload unit in the information field when payload units with  
unsuccessive numbers are retransmitted in the protocol frame in a special  
situation, which is, for example, a change in the data rate.